

We claim:

1 1. A reactor which uses process gasses, said reactor comprising:
2 a reactor chamber;
3 an electrode located in said reactor chamber;
4 a heater that heats said electrode in order to effect materials deposited
5 thereon.

1 2. The reactor of claim 1 wherein:
2 said heater is incorporated into said electrode.

1 3. The reactor of claim 1 wherein:
2 said electrode is an upper electrode.

1 4. The reactor of claim 1 wherein:
2 said electrode is an upper electrode;
3 a chuck located in said reactor chamber; and
4 a lower electrode associated with said chuck.

1 5. The reactor of claim 1 wherein:
2 said heater includes a plurality of heater elements which are disposed
3 along radii of said electrode.

1 6. The reactor of claim 1 wherein:
2 said electrode has bores provided therein;
3 said heater includes a plurality of heater elements which are located
4 through said bores of said electrode.

1 7. The reactor of claim 1 wherein:
2 a thermocouple is associated with said heater.

1 8. The reactor of claim 1 wherein:
2 said electrode is comprised of aluminum and the heater can heat the
3 electrode to a maximum temperature of about 300°C to about 350°C.

1 9. The reactor of claim 1 wherein:
2 said electrode is comprised of graphite and the heater can heat the
3 electrode to a maximum temperature of about 400°C to about 500°C.

1 10. The reactor of claim 1 wherein:
2 said electrode is comprised of silicon and the heater can heat the electrode
3 to a maximum temperature of about 400°C to about 500°C.

1 11. The reactor of claim 1 wherein:
2 said electrode is an electrical resistance heater.

1 12. A method of operating a reactor which comprises a reactor
2 chamber, an electrode, a heater that heats said electrode, and gas inlets and
3 outlets, the method comprising:
4 introducing process gas into said reactor chamber;
5 providing power to said electrode in order to facilitate a reaction with said
6 process gas and a workpiece contained in said reactor chamber; and
7 heating the electrode with said heater to a temperature which encourages
8 the growth of a stable layer of material on said electrode.

1 13. The method of claim 12 wherein said heating step includes:
2 heating the electrode to a temperature above a floating temperature that
3 the electrode would otherwise attain during operation of the reactor without the
4 heater.

1 14. The method of claim 12 wherein said heating step includes:
2 heating the electrode to about 300°C to about 500°C.

1 15. The method of claim 12 wherein:
2 the method of operation of the reactor is an etch method.

1 16. The method of claim 12 wherein:
2 the method of operation of the reactor is a platinum etch method.

1 17. The reactor of claim 1 wherein:
2 said reactor is an etch reactor.

1 18. The reactor of claim 1 wherein:
2 said reactor is a platinum etch reactor.

1 19. The method of claim 16 wherein oxygen and chlorine are present in
2 the reactor, the method includes:
3 heating the electrode in order to cause deposits of oxygen and chlorine to
4 de-absorb from the electrode in order to leave mostly platinum deposited on the
5 electrode.

1 20. A reactor which uses process gasses, said reactor comprising:
2 a reactor chamber;
3 an electrode located in said reactor chamber;
4 said electrode being textured in order to encourage deposits to adhere to
5 the surface of the electrode.

1 21. The reactor of claim 20 wherein the reactor is an etch reactor.

1 22. The reactor of claim 20 wherein the reactor is a platinum etch
2 reactor.

1 23. The reactor of claim 20 wherein said electrode is an upper
2 electrode.

1 24. The reactor of claim 20 wherein said electrode is textured in an
2 irregular pattern.

1 25. The reactor of claim 20 wherein said electrode is textured so as to
2 have a scalloped surface and wherein said scallops are at least one of concave
3 scallop and convex scallop.

1 26. The reactor of claim 20 wherein said electrode is textured so that the
2 surface of the electrode has a multiplicity of peaks and a multiplicity of valleys.

1 27. The reactor of claim 26 wherein:
2 there is an average peak to peak width and an average valley depth;

1 an aspect ratio is defined as the average peak to peak width divided by the
2 mean valley depth; and

3 the aspect ratio is chosen in order to maximize the formation of a deposit
4 on the surface of the electrode which will cause good adherence of the by-products
5 of the reaction carried on in the reactor onto the surface of the electrode.

1 28. The reactor of claim 1 including a non-volatile material etch reactor.

1 29. The reactor of claim 20 including a non-volatile material etch reactor.

1 30. The method of claim 12 including a non-volatile material etch
2 process.

1 31. The reactor of claim 12 including the step of etching one of the group
2 consisting of titanium (Ti), titanium nitride (TiN), platinum (Pt), iridium (Ir), iridium
3 oxide (IrO₂), barium strontium titanate (BST), strontium bismuth tantalate (SBT),
4 strontium titanate (STO), ruthenium (Ru), ruthenium oxide (RuO₂), and lead
5 zirconium titanate (PZT).

1 32. A reactor which uses process gasses, said reactor comprising:
2 a reactor chamber;
3 a surface located in said reactor chamber;
4 a heater that heats said surface in order to effect a material film deposited
5 thereon.

1 33. The reactor of claim 32 wherein:
2 said surface is textured.

1 34. A reactor which uses process gasses, said reactor comprising:
2 a reactor chamber;
3 a surface located in said reactor chamber;
4 said surface being textured in order to encourage materials to adhere to
5 the surface.

1 35. The reactor of claim 1 wherein said electrode is precoated with a
2 film adhesion promoter.

1 36. The reactor of claim 35 wherein said film adhesion promoter
2 includes one of titanium (Ti) and titanium nitride (TiN).

1 37. A reactor which uses process gases, said reactor comprising:
2 a reactor chamber; and
3 precoating at least some internal surface of the reactor chamber with a
4 adhesion promoter in order to encourage the development of durable deposits
5 thereon which will be less likely to interfere with the deposit of a film on a
6 workpiece.

1 38. The reactor of claim 37 wherein said film adhesion promoter
2 includes one of titanium (Ti), titanium nitride (TiN), platinum (Pt), iridium (Ir), iridium
3 oxide (IrO₂), barium strontium titanate (BST), strontium bismuth tantalate (SBT),
4 strontium titanate (STO), ruthenium (Ru), ruthenium oxide (RuO₂), and lead
5 zirconium titanate (PZT).

1 39. The reactor of claim 20 wherein said electrode is precoated with a
2 film adhesion promoter.

1 40. The reactor of claim 39 wherein said film adhesion promoter
2 includes at least one of titanium (Ti), titanium nitride (TiN), platinum (Pt), iridium (Ir),
3 iridium oxide (IrO₂), barium strontium titanate (BST), strontium bismuth tantalate
4 (SBT), strontium titanate (STO), ruthenium (Ru), ruthenium oxide (RuO₂), and lead
5 zirconium titanate (PZT).

1 41. The reactor of claim 32 wherein said surface is a deposition shield.

1 42. The reactor of claim 34 wherein said surface is a deposition shield.

1 43. A reactor which uses process gasses, said reactor comprising:
2 a reactor chamber;
3 a surface located in said reactor chamber;
4 said surface is matt finished in order to encourage materials to adhere to
5 the surface.

1 44. The reactor of claim 37 wherein said precoating is a non-volatile
2 film.

1 45. A replaceable component for a reactor comprising:
2 a replaceable element;
3 said element including devices adapted to receive heaters for heating the
4 element in order to encourage the deposition of films.

1 46. The replaceable component of claim 45 including:
2 heaters incorporated in the replaceable element.

1 47. The replaceable component of claim 45 wherein said replaceable
2 component is one of an electrode, and a deposition shield.

1 48. A replaceable component of a reactor comprising:
2 a replaceable element;
3 said element being textured in order to encourage the deposit of films.

1 49. The replaceable component of claim 48 wherein said textured
2 element includes a textured surface which has at least one of scallops, peaks,
3 perforations, grooves, channels, a screened surface, and a matt-finished surface.

1 50. The replaceable component of claim 48 wherein said replaceable
2 element is one of an electrode and a deposition shield.

1 51. A replaceable component of a reactor comprising:
2 a replaceable element;
3 said element being a precoat in order to encourage the adherence
4 thereto of a deposit.

1 52. The replaceable component of claim 51 wherein said precoat is
2 of a non-volatile material.

1 53. The replaceable component of claim 52 wherein said precoat is
2 provided and one of a replaceable electrode and a replaceable shield.

1 54. The replaceable component of claim 51 wherein said precoating is
2 one of titanium (Ti), titanium nitride (TiN), platinum (Pt), iridium (Ir), iridium oxide
3 (IrO_2), barium strontium titanate (BST), strontium bismuth tantalate (SBT), strontium
4 titanate (STO), ruthenium (Ru), ruthenium oxide (RuO_2), and lead zirconium titanate
5 (PZT).

1 55. A reactor which uses process gasses, said reactor comprising:
2 a reactor chamber;
3 an electrode located in said reactor chamber;
4 a heating means for heating said electrode in order to effect materials
5 deposited thereon.